Title: The Sweet Tooth Factory

Brief Overview:

The students involved in this task will go into The Sweet Tooth Factory. While in the factory, the students will help the workers with various fraction tasks. They will help one worker identify fractions, then help another by cutting things into fair shares and then compare fractions with the last worker. In doing these things the students will be using a variety of strategies (cooperative groups, literature, etc.) to gain a better understanding of fractions as a whole, a part of a set, fair shares, and ordering and comparing fractions.

NCTM 2000 Principles for School Mathematics:

- **Equity:** *Excellence in mathematics education requires equity - high expectations and strong support for all students.*
- **Curriculum:** *A curriculum is more than a collection of activities: it must be coherent, focused on important mathematics, and well articulated across the grades.*
- **Teaching:** *Effective mathematics teaching requires understanding what students know and need to learn and then challenging and supporting them to learn it well.*
- **Learning:** *Students must learn mathematics with understanding, actively building new knowledge from experience and prior knowledge.*
- **Assessment:** *Assessment should support the learning of important mathematics and furnish useful information to both teachers and students.*
- **Technology:** *Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students' learning.*

Links to NCTM 2000 Standards:

- **Content Standards**

<u>Number and Operations</u>

- *Understand and represent commonly used fractions such as 1/4, 1/3, 1/2.*

- **Process Standards**

<u>Problem Solving</u>

- *Apply and adapt a variety of appropriate strategies to solve problems.*

Communication

- *Organize and consolidate their mathematical thinking through communication.*
- *Communicate their mathematical thinking coherently and clearly to others.*

Connections

- *Recognize and use connections among mathematical ideas.*

Representation

- *Create and use representations to organize, record, and communicate mathematical ideas.*
- *Select, apply, and translate among mathematical representations to solve problems.*

Grade/Level:

2^{nd} – 3^{rd} Grade Students (including special education students)

Duration/Length:

3-4 days/ approx. 30 – 45 minutes per day

Prerequisite Knowledge:

Students should have working knowledge of the following skills:

- Fractions (1/2, 1/3, 1/4, etc.)
- Parts of a set
- Fair shares
- Comparing and ordering fractions
- Basic math vocabulary
- Basic understanding of greater then and less than

Student Outcomes:

Students will:

- work collaboratively in groups and individually.
- understand fractional parts of a whole and a set.
- read to perform a task.
- write to persuade.
- compare and order fractions from smallest to greatest.
- understand and demonstrate the concept of fair share.

Materials/Resources/Printed Materials:

- An overhead of Frannie Factory's letter to the students
- Fraction Circles or Bars
- The Hershey Faction Book by Jerry Pallotta
- The Doorbell Rang by Pat Hutchins
- Fraction Fun by David Adler
- Eating Fractions by Bruce McMillan
- Cookie skill sheet for each group of children
- Crayons
- Scissors
- 12 X 18 white construction paper
- Gluesticks
- Index cards

Development/Procedures:

Day 1

Materials

- 1 copy for each student of **Student Resource Pages 1 – 4**
- Book: Fraction Fun by David Adler

Introduction

- Read Fraction Fun by David Adler.
- Review the definition of the numerator and the denominator. Show a fraction and label the numerator and the denominator.

Activity

- Read Frannie Fraction's letter to the students. This can be made into an overhead.
- Discuss the three departments in the factory that the students are going to investigate, Joe's Jellybeans, Cindy's Cookies, and Fred's Fruits.
- Say, "Today we are going to visit Joe's Jellybeans at The Sweet Tooth Factory." Have students read **Student Resource Page 1.** Together discuss Joe's problem. Now discuss the example on the page.
- Have students get into pairs and work on Joe's Dilemma on **Student Resource Pages 2 and 3**. (Give approx. 10 minutes for this activity.) Then together as a class, discuss the answers.

Assessment

- Have each child individually complete **Student Resource Page 4.**

Day 2

Introduction

- Review the previous lesson with the children.
- Read the story The Hershey's Milk Chocolate Fractions Book, by Jerry Pallotta. Have a class discussion.
- Have the children define the term fair shares and place word on the Math Wall.

- Use fraction circles or fraction bars and demonstrate fair shares to the students. (An overhead set is very helpful.)
- Allow students the opportunity to work along with you with their fraction circles or bars.

Activity

- Read to the children The Doorbell Rang by Pat Hutchins.
- After children have had the opportunity to practice fair shares at their desk, place the students into groups of three or five.
- Place the overhead Cindy's Cookie Cover-up on the overhead. **(Teacher Resource Page 1)**
- Have a child read the overhead.
- Give each group a task card. Have them solve the problem on the card. (**Student Resource Pages 5, 6, and 7)**

Assessment

- After students have completed their tasks, have the groups share their task cards and their solutions.
- Hang up the solution papers around the room. (Optional)
- Have students write their own task cards and have the other students solve them. (Optional)

Enrichment

- Addition and Subtraction of equivalent fractions are included.

Teacher Resource Page 2 – Answer Key to the Task Cards
Student Resource Page 8-9 – Enrichment Task Cards

Day 3

Introduction

- Review the previous lesson with the students.
- Explain to the students that today they will continue their trip to the Sweet Tooth Factory and visit "Fascinating Fred" in the fruit department.

Activities

- Read the book Eating Fractions By Bruce McMillan.
- Begin by using an overhead of **Teacher Resource Page 3.**
- Have the students cut and glue the fractions on the Fruity Fractions student resource page onto index cards. Then cut the fractions and glue onto the back of the matching fraction. Use **Student Resource Pages 10 and 11.**
- Introduce the rules to the game Tic-Tac-Toe. Place students into pairs. Distribute two different colors of counters to the paired students to use in playing the game. **Student Resource Page 12.**
- Next review comparing fractional parts. Give examples of fractions like 1/2 and 1/3. Have the students use fraction circles to show the parts. Now discuss which is larger and why it is larger. Then give the students **Student Resource Page 13.**

Assessment

- Students are assessed through teacher observations and checklist as they engage in the activities. At the end of the activities have students review identifying fractions using **Student Page 14.**

Performance Assessment: (Student Assessment Resource Pages A1-A6)

This unit will have an ongoing assessment, as well as an assessment at the end. The ongoing assessments will come with the daily activities. The ending assessment is made up of questions relating to the objectives for the unit and will be scored using a rubric. See Performance Assessment Pages located at the end of the unit.
(**Teacher Assessment Pages B1-B2**)

Extension/Follow Up:

The teacher could extend this unit by:

- Making a dessert pizza with the students after the ending assessment.
- Putting fractions in order from greatest to smallest using different fractions.

Authors:

Jennifer Reburn
Centerville Elementary School
Queen Anne's County, MD

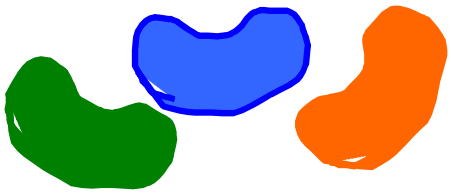
Sheryl Sugg
Emily Spong Elementary
Portsmouth, VA

Zina Harper
Whitcomb Elementary
Richmond, VA

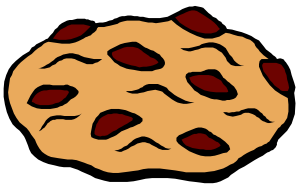
Dear Boys and Girls,

Hi, I am the manager of The Sweet Tooth Factory. I have been having some major problems in each department of my factory. Joe in the jelly bean department doesn't know his fractions. Cindy in the cookie department is having trouble with being fair, and Fred in the fruit department is going bananas over comparing and ordering fractions. I can't seem to find the time to help them. I have made arrangements for you to come into my factory and help. I hope that you will be able to help my workers. Have fun and work hard!

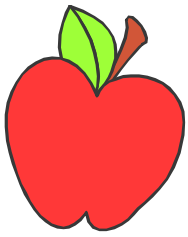
Thank you,
Frannie Fraction



Joe's Jelly Beans



Cindy's Cookies



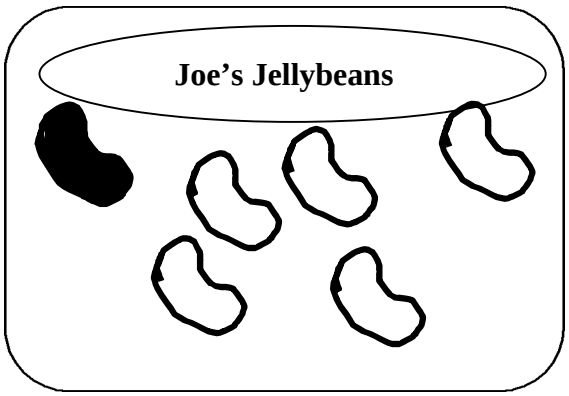
Fred's Fruits

Joe's Dilemma

Joe puts the jellybeans in bags after they come out of the jellybean-making machine. He has been asked by your teacher to make some special jellybean bags for a lesson on fractions. Your teacher has also asked Joe to label each bag according to the jellybeans that are black. Joe didn't have any problem putting jellybeans in the bags but he needs help with the fractions! He would like for you to label each bag.

Directions:

Label each bag with the fraction that matches. What fraction of jellybeans is black? Write the answer in the box provided. The first one is done for you as an example.



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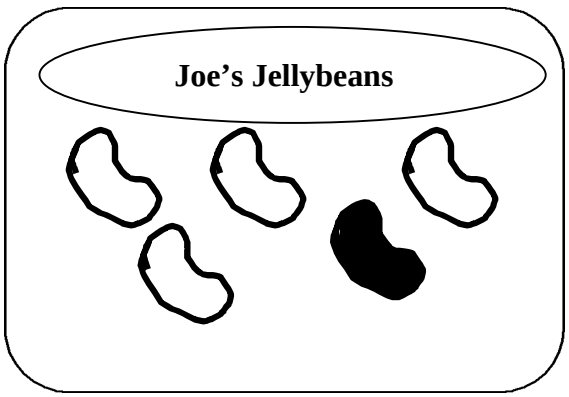
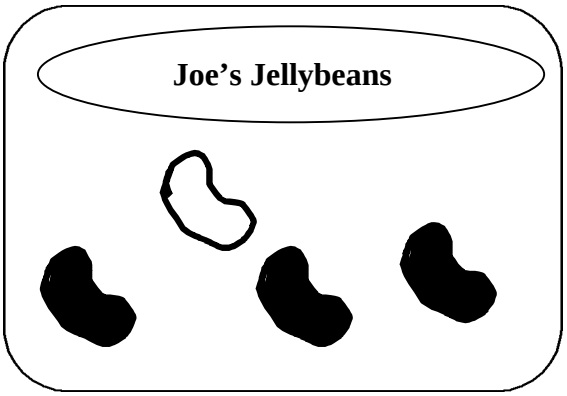
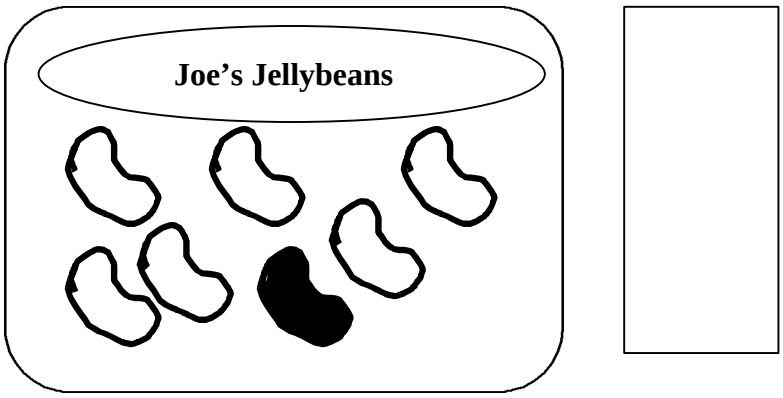
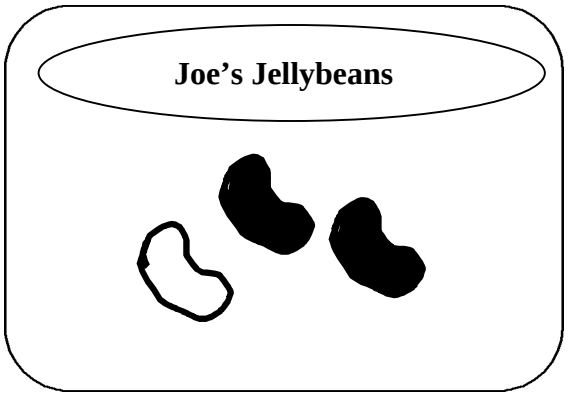


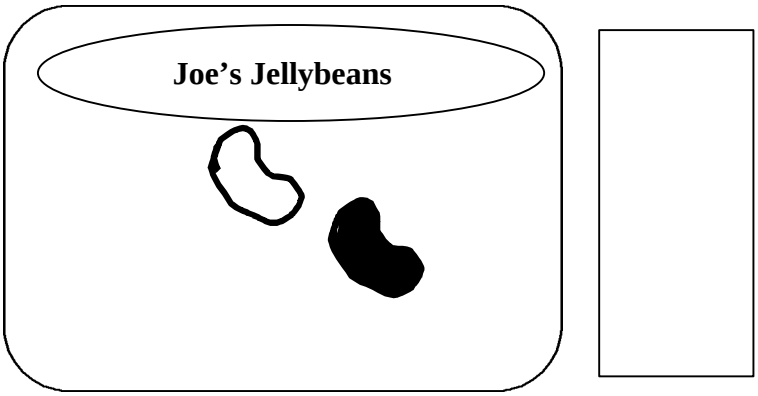
Use these fractions to match the bags. The fraction in the box shows which part is shaded.

$\frac{1}{2}$ $\frac{1}{4}$ $\frac{1}{5}$ $\frac{1}{7}$ $\frac{1}{3}$


Joe's Jellybeans


Joe's Jellybeans


Joe's Jellybeans


Joe's Jellybeans

You have just finished helping Joe label his jellybean bags with the fraction matches. Now read and answer the question below.

Does the fraction 2/4 match the part of the shape that is shaded? Explain your answer.

Cindy's Cookie Cover-Up

M E M O

To: Students
From: Ms. Frannie Fraction
Re: Fair Shares

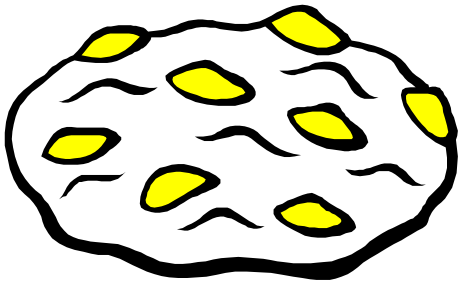
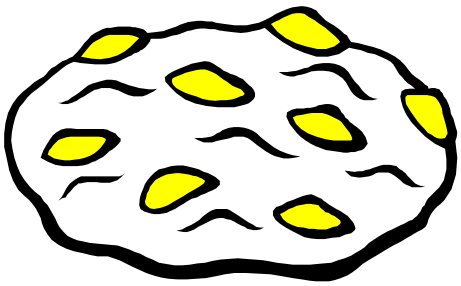
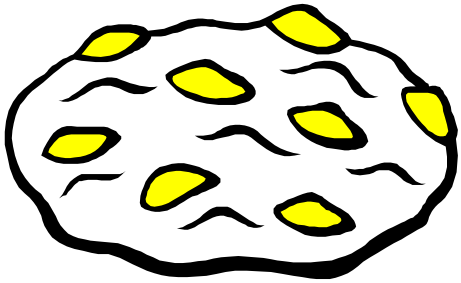
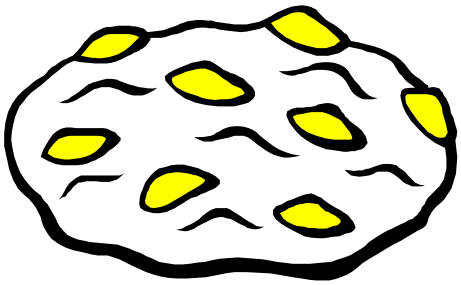
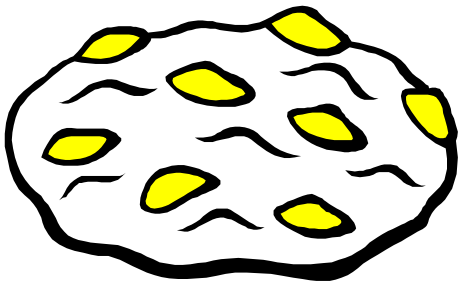
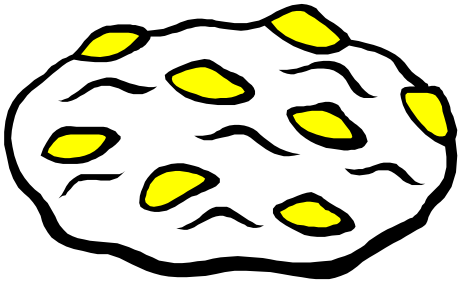
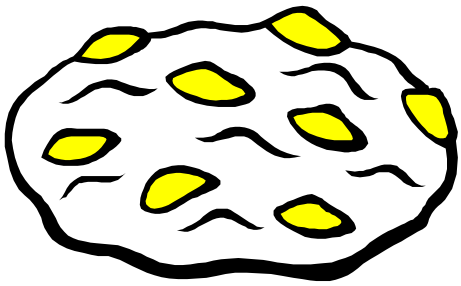
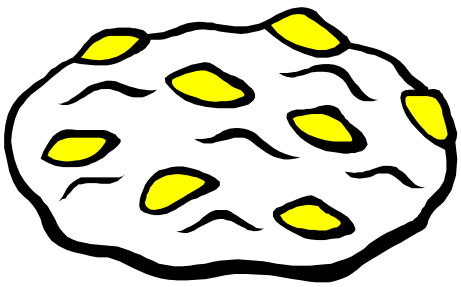
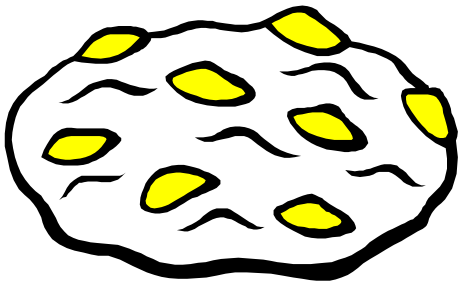
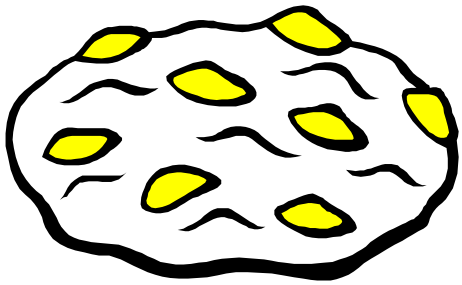
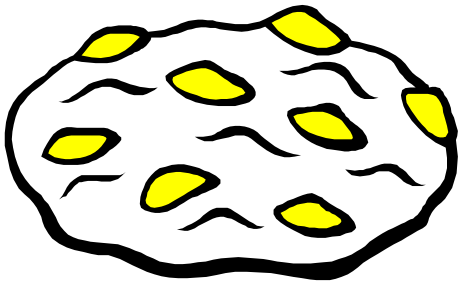
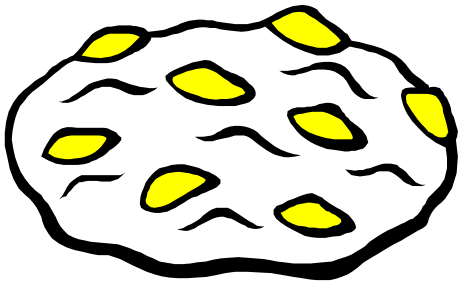
Dear Students:

It has come to my attention that children are not getting fair shares of cookies when you come to visit the cookie department. Your task is to find the fair share for these students.

Here are some events that occurred in the cookie department. Read the task card and develop your solution.

To complete the task cards you must do the following:

1. Write down how you are going to solve the problem.
2. Test your solution. Show your work.

Task Card One

A group of 12 children came to the cookie department. After the tour was over the children sat at the table waiting for their treats. Cindy put out a plate of 6 cookies

Using the cookies, help Cindy make sure that everybody gets a fair share of the cookies. Remember your guidelines!!

Task Card Two

A group of 9 children came to the cookie department. After the tour was over the children sat at the table waiting for their treats. Cindy put out a plate of 3 cookies.

Using the cookies, help Cindy make sure that everybody gets a fair share of the cookies. Remember your guidelines!!

Task Card Three

A group of 24 children came to the cookie department. After the tour was over the children sat at the table waiting for their treats. Cindy put out a plate of 6 cookies.

Using the cookies, help Cindy make sure that everybody gets a fair share of the cookies. Remember your guidelines!!

Task Card Four

A group of 15 children came to the cookie department. After the tour was over the children sat at the table waiting for their treats. Cindy put out a plate of 3 cookies.

Using the cookies, help Cindy make sure that everybody gets a fair share of the cookies. Remember your guidelines!!

Task Card Five

A group of 21 children came to the cookie department. After the tour was over the children sat at the table waiting for their treats. Cindy put out a plate of 7 cookies.
Using the cookies, help Cindy make sure that everybody gets a fair share of the cookies. Remember your guidelines!!

Task Card Six

A group of _____ children came to the cookie department. After the tour was over the children sat the table waiting for their treats. Cindy passed out a plate of cookies. Using the cookies, help Cindy make sure that everybody gets a fair share of cookies. Remember your guidelines.

Task Card Seven

Enrichment Task Card One

Cindy has 2/4 of a chocolate chip cookie on her plate. Sam placed 1/4 of a chocolate chip cookie on her plate. What is the sum of the cookies on the plate? Draw a picture of your solution.

Enrichment Task Card Two

Jennifer has 2/4 of a candy bar. Rich has 2/4 of a candy bar. How much of the candy bar do they have? Draw a picture of your solution.

Enrichment Task Card Three

Zina has 4/10 of an apple. Karen has 2/10 of an apple. What fraction of an apple do they have if they join their shares together? Draw a picture of your solution.

Enrichment Task Card Four

Tom has 11/12 of a sweet potato pie. His friend John came up and asked for 6/12 of his pie. What amount of pie does Tom have left? Draw a picture of your solution.

Enrichment Task Card Five (Extension)

Marsha and Bert wanted to split a plate of 18 cookies. Marsha only wanted 2/3 of the cookies and Bert wanted 1/6 of the cookies. How would they solve this problem? What fraction of the cookies did each person get? Show your work and be able to explain your answer.

Enrichment Task Card

Enrichment Task Card

Answer Key to Task Cards

Fair Shares

Task Card One: 1/ 2 cookie per child

Task Card Two: 1/3 of a cookie per child.

Task Card Three: 1/4 of a cookie per child.

Task Card Four: 1/5 of a cookie per child.

Task Card Five: 1/3 of a cookie per child.

Enrichment:
Addition and Subtraction

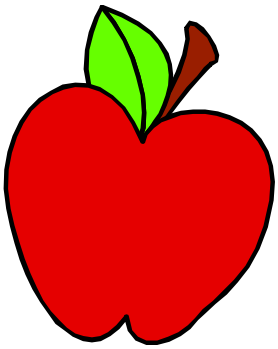
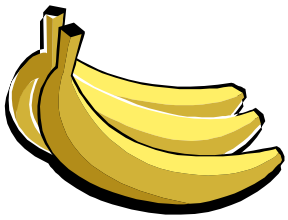
Enrichment Task Card One: The sum is 3/4 or one whole cookie.

Enrichment Task Card Two: The sum is 4/4 (or one whole) candy bar.

Enrichment Task Card Three: The fraction of the apple is 6/10.

Enrichment Task Card Four: The difference is 5/12.

Enrichment Task Card Five: Marsha would get 12 cookies (12/18) and Bert would get 3 cookies (3/18). There are three cookies left over.

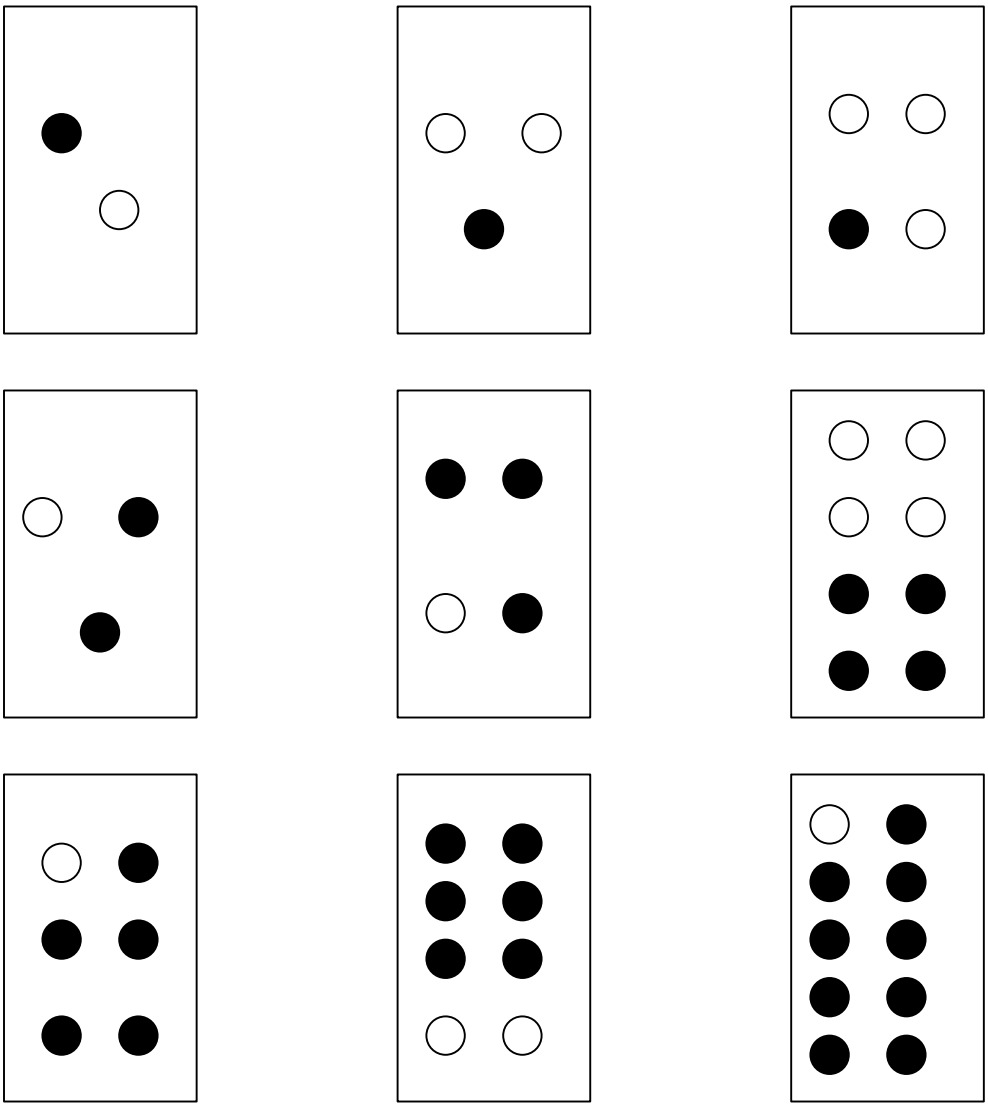



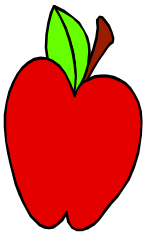

Fruity Fruit Factory

On this day you are going to enter the fruity section of the factory and meet Fascinating Fred who is fascinated with all of the sweet smelling fruit. However, someone came into the factory during the night and scattered his grapes. You can each have some of the grapes if you help to put the grape back into the proper basket. He gives each of you a card with a fractional part (1/2, 1/3, 1/4, 1/5) etc. Students match the fractional card to the shaded sets of grapes.

- Cut out the fractional cards and glue them on one side of the index cards.
- On the opposite side, glue the grape cards that match the fractions.

Grapes



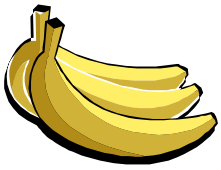


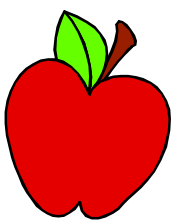
Fractional Cards for Fruity Fractions

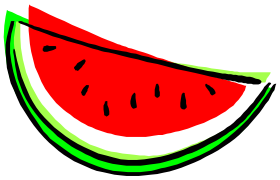
$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$
$\frac{2}{3}$	$\frac{3}{4}$	$\frac{4}{8}$
$\frac{5}{6}$	$\frac{6}{8}$	$\frac{9}{10}$

Let's Play Fruity Tic-Tac-Toe!

Choose a partner for this activity. Use one set of fruity cards. You and your partner will take turns choosing fruity cards. Choose a card one at a time and determine what part of the fruit is shaded in, if the fraction given is correct then that player places a counter on the Tic Tac Toe board. The first player to get three in a row is the winner.







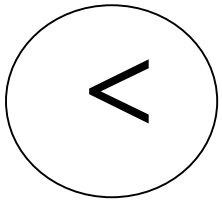
Am I Greater or Less?

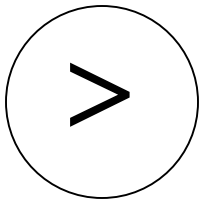
Compare the fractions!

Color the circle that would fit between the fractions below.

1. $\frac{1}{3}$ $\frac{1}{2}$

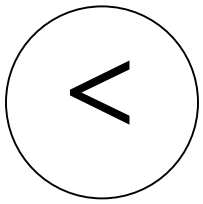
2. $\frac{3}{8}$ $\frac{5}{8}$

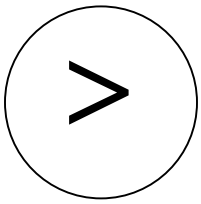




3. $\frac{3}{4}$ $\frac{6}{8}$

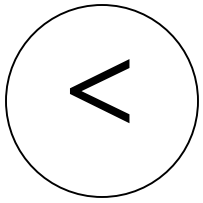
4. $\frac{3}{6}$ $\frac{6}{6}$

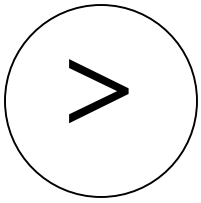




5. $\frac{2}{5}$ $\frac{4}{3}$

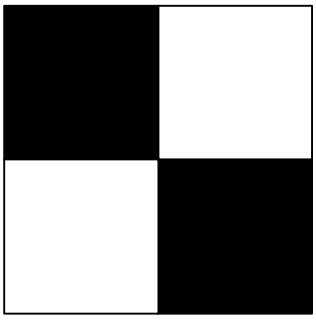
6. $\frac{10}{12}$ $\frac{7}{12}$

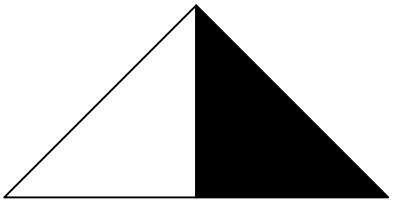


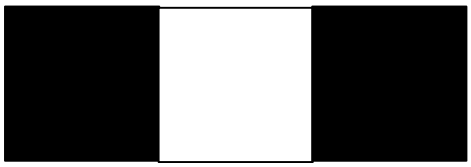


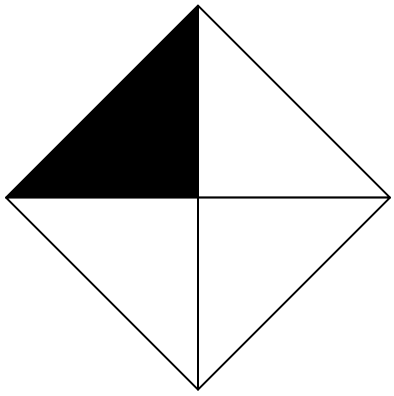
What's the Fraction?

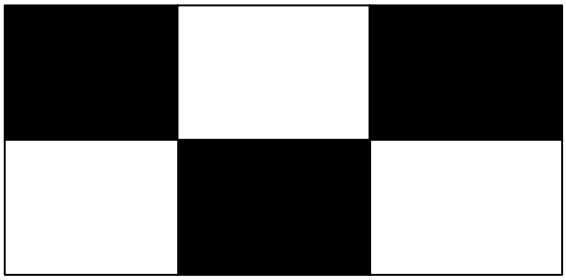
Write the fraction in the box next to the shape. Identify the part of the fraction that is shaded.

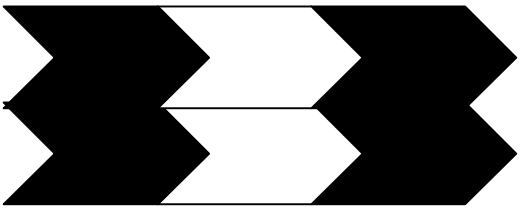












Now I would like to invite you to be on our research committee. I would like for you to do some work with the new dessert pizza our company plans on selling. Read the directions below complete the task and report to me at the end.

Pizza A

We want a dessert pizza for 4 people. On the pizza we want apple slices and caramel pieces. First cut the pizza so that each person would have a fair share. Then, put the toppings on so that each piece has a fair amount.

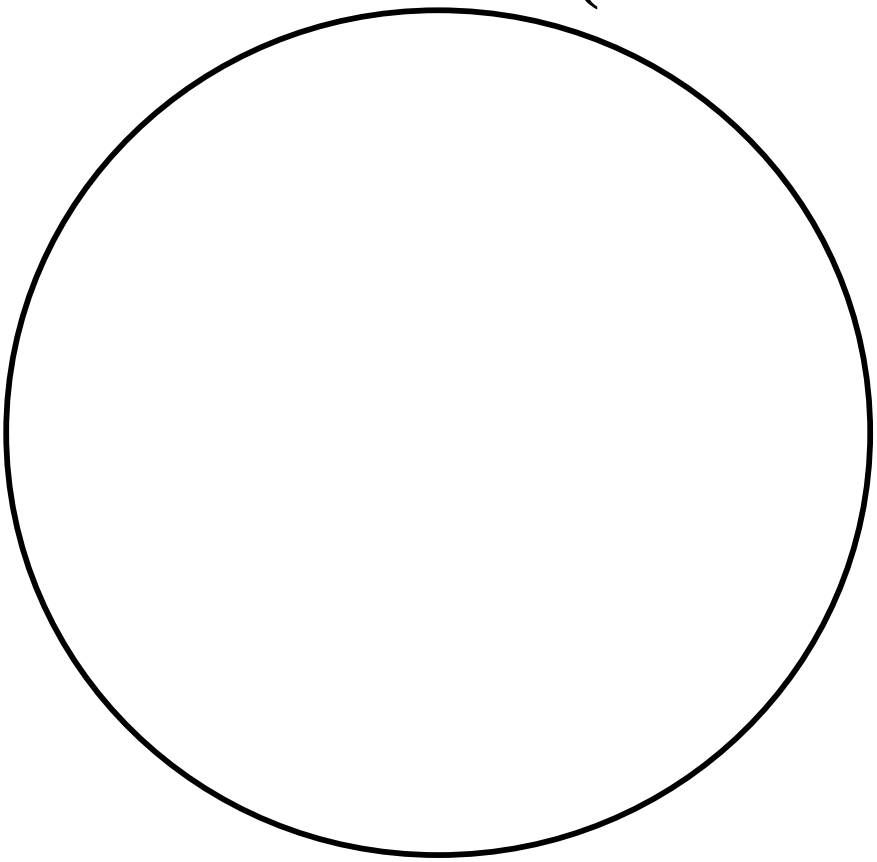
Ingredients for you to use:
1 apple cut into 8 slices
16 caramel chunks
1 dessert pizza

Pizza B

We want a dessert pizza for 8 people. On the pizza we want apple slices and caramel pieces. First cut the pizza so that each person has a fair share. Then, put on the toppings so that each slice has a fair amount.

Ingredients for you to use:
1 apple cut into 8 slices
16 caramel chunks
1 dessert pizza

Pizza A (cut into 4 slices)



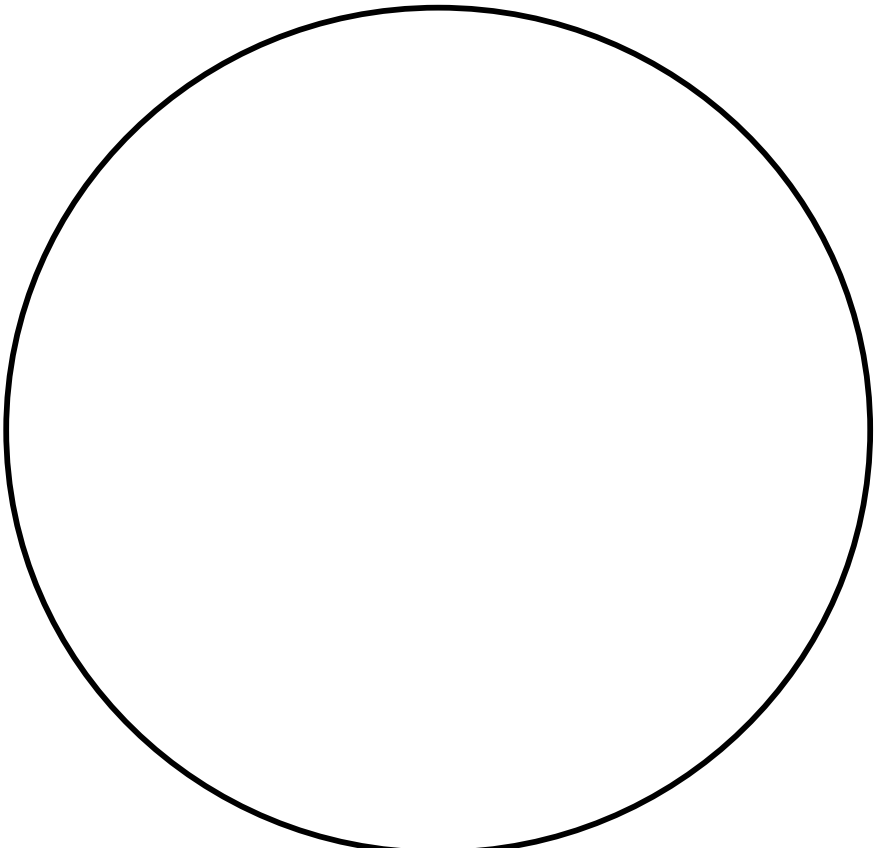
Write the fractional part of 1 slice.

1 slice has:

Apple

Bag of Caramel Chunks

Pizza B (cut into 8 slices)



Write the fractional part of 1 slice.

1 slice has:

Apple

Bag of Caramel Chunks

1. You have just finished making each pizza. Explain how you cut the pizzas so that each person receives a fair share.

_____
_____
_____
_____
_____

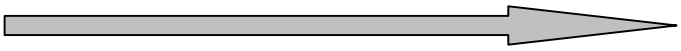
2. You get to sample a slice of the new dessert pizza.
   Would you like a slice from Pizza A or Pizza B? _____

   Explain why you chose that slice. Remember to use complete sentences and math words.

_____
_____
_____
_____
_____

3. The workers in the company are curious about the sizes of pizza slices. They would like for you to look at the fractions below and put them in order from smallest to greatest. Use your fraction circles to help you.

1/5 1/2 1/8 1/4 1/12

Smallest  Greatest

_____

Write to Persuade

Today you will be writing to persuade. When you write to persuade, you want to convince someone else to do or think about something the way you do.

You have just finished your investigation and research for The Sweet Tooth Factory. You will be writing a letter to the president of the company who doesn't understand fractions or fair shares. Now, decide which pizza you think that the company should sell, Pizza A that is cut into fourths or Pizza B that is cut into eighths. Now you are going to write a letter persuading the president of the company to sell the dessert pizza you chose.

Before you begin to write think about:

- Think about which pizza you want the company to sell.
- Think about three reasons for the company to sell that pizza, remember to use math vocabulary.
- Think about what the president knows about fractions and fair shares.

Now write a letter to persuade the president of the company to sell dessert pizzas sliced in the fractional way you chose.

Form

Audience

Topic

Purpose

The Sweet Tooth Factory

_____
Date

_____,

_____

_____

_____

_____

_____

_____

_____

_____

_____

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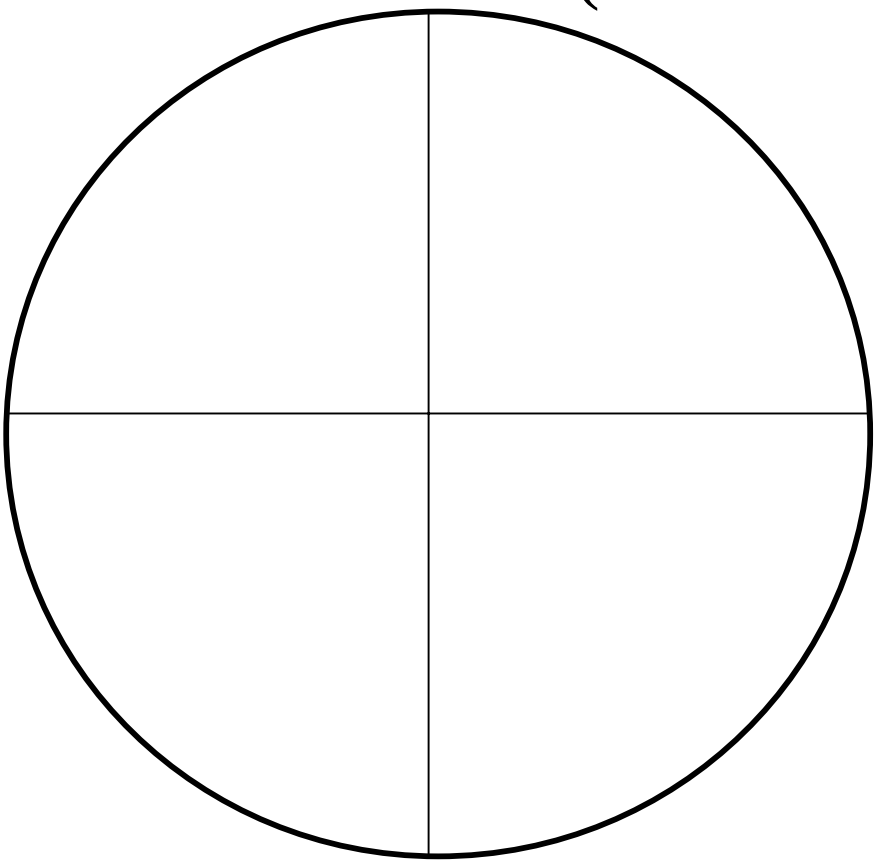
_____,

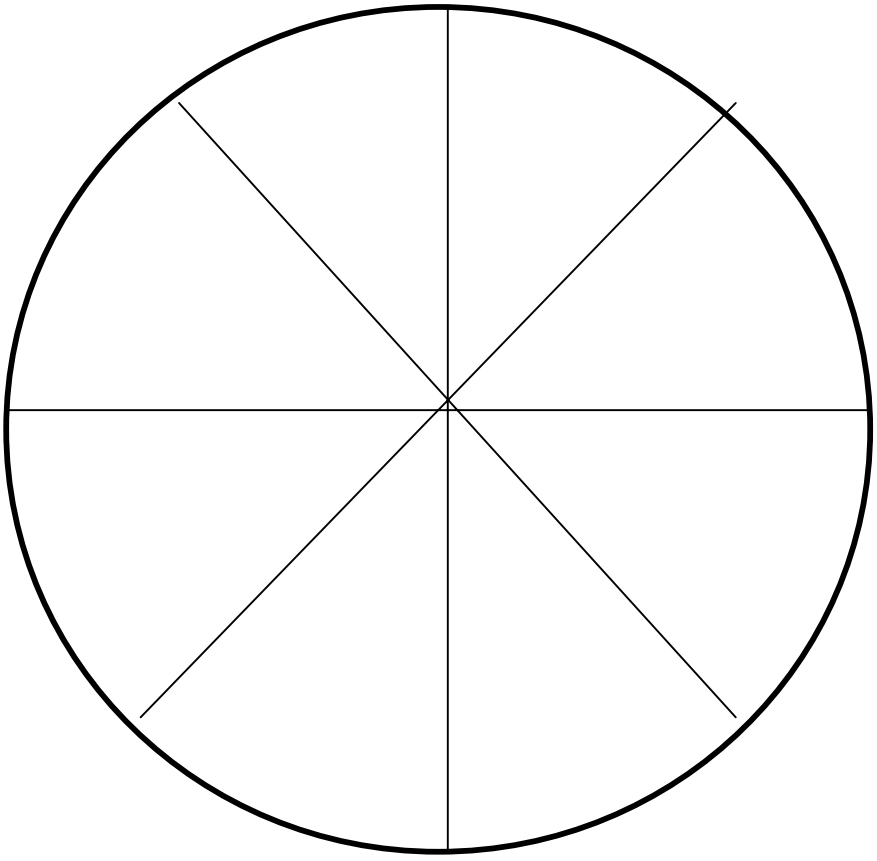
Pizza A (cut into 4 slices)



$\frac{2}{8}$

$\frac{4}{16}$

Pizza B (cut into 8 slices)



Write the fractional part of 1 slice.

1 slice has:

Apple $\frac{1}{8}$

Bag of Caramel Chunks $\frac{2}{16}$

1. You have just finished making each pizza. Explain how you cut the pizzas so that each person receives a fair share.
   This answer should explain the concept of fair share

2. You get to sample a slice of the new dessert pizza.
   Would you like a slice from Pizza A or Pizza B? _____

   Explain why you chose that slice. Remember to use complete sentences and math words.
   The answer should support the slice that the student chose in the first part of this question.

3. The workers in the company are curious about the sizes of pizza slices. They would like for you to look at the fractions below and put them in order from smallest to greatest. Use your fraction circles to help you.

1/5 1/2 1/8 1/4 1/12

Smallest  Greatest

1/12 ***1/8*** ***1/5*** ***1/4*** ***1/2***

The Sweet Tooth Factory Performance Assessment Writing Rubric

In order to receive a 3, 2, 1, or 0 refer to the chart below:

3 The student has: • Written a letter with the correct topic, audience, and purpose. • Identified which pizza to sell and given at least 3 reasons to support. • Used good mathematical language about fractions and fair shares.
2 The student has: • Written a letter with the at least two correct out of the form, audience, topic, and purpose. • Identified which pizza to sell and has given at least 2 reasons to support. • Used some mathematical language about fractions and fair shares.
1 The student has: • Written a letter with one or two correct out of the form, audience, topic, and purpose. • Identified which pizza to sell and has given little reason to support. • Used little mathematical language about fractions and fair shares.
0 • The student didn't attempt to stay on topic.

Literature Connections for Fractions

Fraction Fun	David A. Adler
The Hershey's Milk Chocolate Book	Jerry Palotta
Dad's Diet	B. Comber
Eating Fractions	Bruce McMillian
Gator Pie	Louise Mathews
The Teacher from the Black Lagoon	Mike Thaler
The Doorbell Rang	Pat Hutchins
A-Apple Pie	Kate Greenway
Half and Half	J. Nelson
Lucy and Tom's 1,2,3	Shirley Hutchins
The Half-Birthday Party	Charlotte Pomerantz
The Philharmonic Gets Dressed	Karla Kuskins
Johnny Appleseed	Steven Kellogg
Pezzettino	Leo Lionni
Fractions Are Parts of Things	Richard J. Dennis